Describing the Project: November 2016 Technical Reference section 3.3

Grant Eligibility and General Project Information Tab A.3 Project Description

Regional San's "South Sacramento County Agriculture & Habitat Lands Recycled Water, Groundwater Storage, and Conjunctive Use Program" (Program) is an exceptional opportunity in southern Sacramento County to proactively store and manage groundwater while improving stream flow, enhancing groundwater-dependent riparian habitats, sustaining prime agricultural lands, and improving regional water supply reliability. Regional San is proposing a recycled water program that would serve as the backbone of a multi-benefit recycled water, groundwater storage, and conjunctive use program, protecting and enhancing the special natural and cultural values of southern Sacramento County and contributing to a more resilient water supply for the county and surrounding region. Other area stakeholders, including The Nature Conservancy, the Region's water suppliers, and the Farm Bureau, recognize the potential benefits of the Program and are working with Regional San to shape the Program's design.

The Program has the potential to provide up to 50,000 acre-feet per year (AFY) of recycled water to irrigate up to 16,000 acres of agriculture and habitat lands in Sacramento County. Since the Program would provide recycled water to existing agricultural lands that historically pump groundwater, it would reduce withdrawals of groundwater and allow groundwater levels in the Program area to recover. Additionally, the Program proposes to implement wintertime irrigation and potentially wildlife friendly recharge basins in the project area where the soils are suitable, to provide further groundwater recharge. This recharge program of in-lieu and wintertime irrigation is expected to raise groundwater levels up to 35 feet in the center of the Program area, and 20-30 feet in other parts of the South American groundwater subbasin. This area is important for groundwater dependent ecosystems, like the riparian habitat and wetlands of the Cosumnes River Preserve, Stones Lake National Wildlife Refuge (Stones Lake NWR) and important wildlife-friendly farmlands.

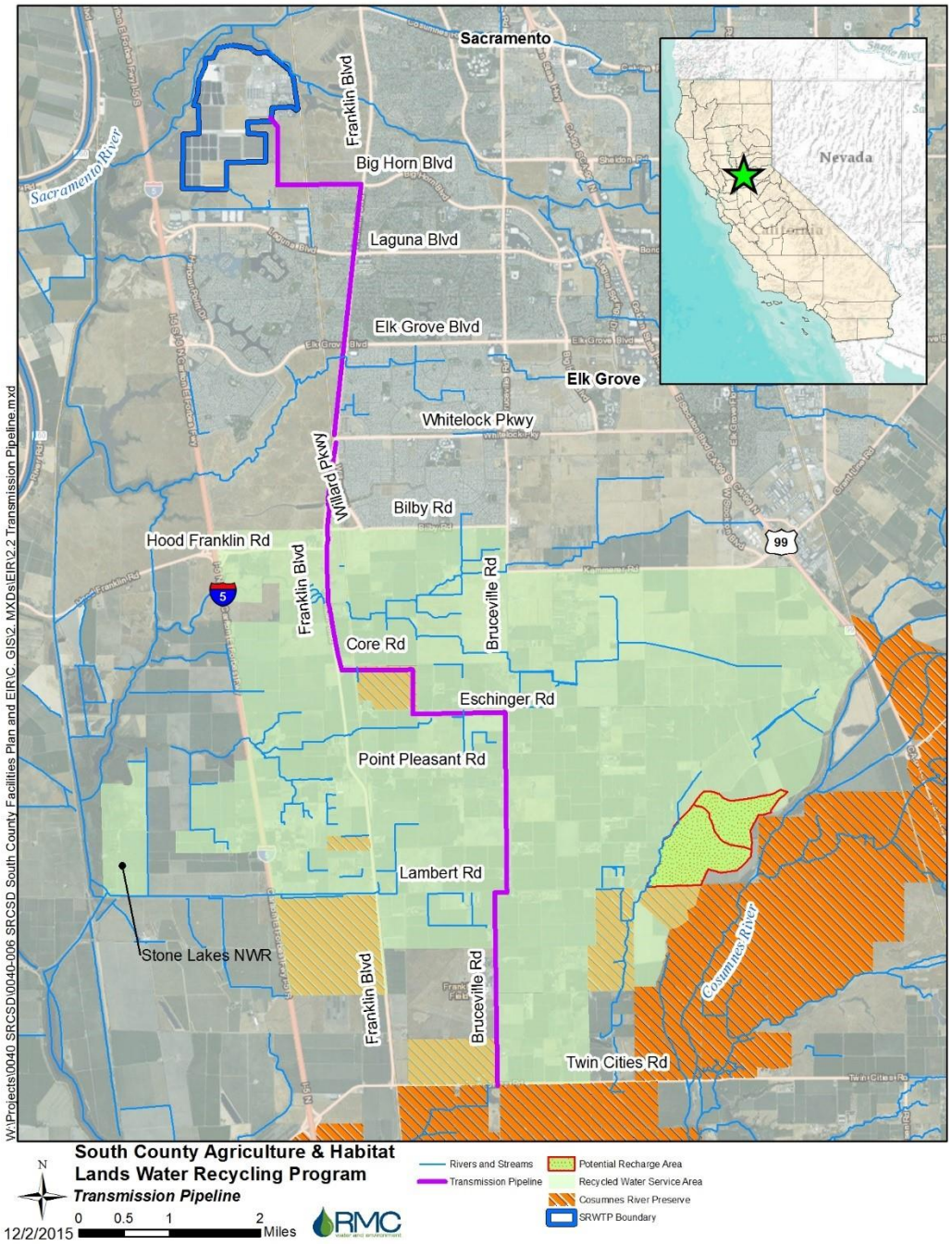
The recharge Program backbone would be coupled with a groundwater and ecosystem management program, accounting for the water that is recharged, setting targets for groundwater levels that are to be maintained, and allowing for withdrawals of a portion of the groundwater that is stored through the in-lieu and wintertime recharge program. Withdrawals are anticipated to be performed in a conjunctive use manner, where extractions would occur when surface water resources are limited, increasing the overall reliability of the water supply system. With the recharge and groundwater management programs in place, the groundwater levels are expected to recover, resulting in additional water being stored in the aquifer that underlies southern Sacramento County. Under 2030 climate conditions, modeling suggests that the Program could increase groundwater storage in the basin by approximately 245,000 AF in 10 years and 320,000 AF within 25 years (RMC, 2017; GRANTS Benefit Calculation, Monetization, and Resiliency tab, A.1 Project Condition. File; "Regional San_SacIWRM ModelingTM_A.1Project Conditions_SecBCMR.pdf"; pg 44 and 86). Additional details on quantitative and qualitative with- and without-Program future conditions are provided in the Benefits Calculation, Monetization, and Resiliency Tab A.1 attachments. See the Preliminary Operations Plan (Benefit Calculation tab, A.2) for additional details on how the Program will function.

Location of the water storage facility (ies)

The proposed Program is located within Southern Sacramento County, and includes portions of unincorporated Sacramento County, and portions of the Stone Lakes NWR. The Program area boundaries are Interstate 5 to the west, Highway 99 to the East, Bilby Road to the North, and Twin Cities Road to the South. The latitude/longitude is 38° 20' 29" N and 121°25'12" W, respectively, at the center of the Program area, as measured near Bruceville Rd and Eschinger Rd.

Proposed facilities include a pump station, pipelines and distribution mains, a recharge area, service connection laterals, appurtenant facilities, and existing raw water distribution infrastructure. The proposed pump station would be located within the Sacramento Regional Wastewater Treatment Plant (SRWTP) site. Transmission pipelines and distribution mains would be located on County and city streets and rural roads, primarily within public road rights-of-way (ROW), although distribution mains may also occur on private lands. The potential recharge area, diluent wells, and service connection laterals would generally be located on private agricultural lands or dirt roads. Recycled water would be delivered to farms, wetlands, and, potentially, a recharge area all of which are currently outside Regional San's service area. The fully implemented Program would include a groundwater bank, associated extraction wells and distribution system, and monitoring equipment. The Program would utilize the existing extraction wells and distribution system of future banking partners, with potential additional system upgrades to meet Program needs. Monitoring associated with the groundwater banking program would utilize both existing infrastructure and new Program monitoring wells in and near the Program area.

Figure 1: Program Location



Total and active water storage capacity

Preliminary modeling suggests that the Program could increase groundwater storage in the basin by approximately 320,000 AF within 25 years, and up to 590,000 acre-feet over the 84-year planning horizon with Program as compared to without Program (Regional San_SacIWRM ModelingTM_A.1Project Conditions_SecBCMR; pg 85-86). The volume actually stored will vary with climate conditions and banking operations on an annual basis. Withdrawals would only occur during

periods with limited surface water resources, which for modeling purposes are estimated to occur 3 years out of 10 during the driest water years. Withdrawals would be based on the amount of available banked water (expected to be approximately 32,500 AFY based on initial modeling) and limited to a maximum of 50,000 AFY in those driest years, leaving approximately 70% or more of the banked water in storage, benefiting rivers and streams.

Sources of water supply

The Program proposes to use Title 22 tertiary-treated recycled water produced from Regional San's upgrade to the wastewater treatment plant, known as the EchoWater project, for irrigating agricultural and habitat lands. The recycled water will be supplied by constructing new recycled water transmission and distribution systems, as described in the Facilities Plan (RMC, 2017 and Eligibility & General Project Information tab, A.4-Project Description Support).

Conveyance capacities for sources of water supply, if applicable

The Program would convey up to 49,500 AFY from the EchoWater facilities to the irrigation and potential recharge areas, and an additional 500 AFY to Stone Lakes NWR. The conveyance facilities are designed for up to 75.2 mgd to meet peak summertime irrigation demands.

Capacities for storage facility outlets, spillways, and direct diversions, if any

Not Applicable

Storage facility capacity-elevation and area-capacity curves

Storage facility capacity-elevation and area-capacity curves are more suited to surface water storage projects. Such a curve for a groundwater project is difficult to develop, as groundwater basins such as the Sacramento Valley Groundwater Basin, are very large and do not function like defined-size reservoirs. In addition, groundwater projects are developed on existing, dynamic groundwater systems, resulting in elevation changes that are a mix of baseline and project effects. The groundwater model outputs in the four figures below show how groundwater storage increases as the basin refills via in-lieu and wintertime recharge. Figures 2 and 4 show how groundwater storage increases over time compared to Program-related increases in groundwater elevations for 2030 and 2070 climate conditions, respectively. Figures 3 and 5 also show change in storage, but compared to simulated groundwater elevations for 2030 and 2070 climate conditions, respectively[1]. For more details on groundwater storage and elevation changes with the Program, see the Benefits Calculation, Monetization, and Resiliency Tab A.1 attachments (Regional San_CALSIM_HEC5Q_ModelingTM_A.1Project Conditions_SecBCMR.pdf and Regional San_SacIWRM ModelingTM_A.1Project Conditions_SecBCMR, Project 2030 Scenario and Project 2070 Scenario).

Generally, it takes time for the basin to fill up and, as time elapses, increases in storage slow down. Modeling has shown the basin mostly filling within 10 years and approaching equilibrium within 25 years. This slowing of increases in storage is related to a shift in benefits over time from storage benefits to streamflow benefits. As Program recharge continues to fill up the basin, extractions in three of the ten driest years also occur. The recharge/extraction cycle causes the storage and groundwater elevation

[1] Groundwater levels above zero in the figures reflect levels above sea level. The ground surface elevations for the Program area range between 5 and 25 feet above sea level.

numbers to band together at the high end, reflecting the changes in storage and groundwater elevation as the basin is recharged and then banked water is extracted.

Figure 2: Simulated change in groundwater storage with change in groundwater elevation, 2030 climate conditions

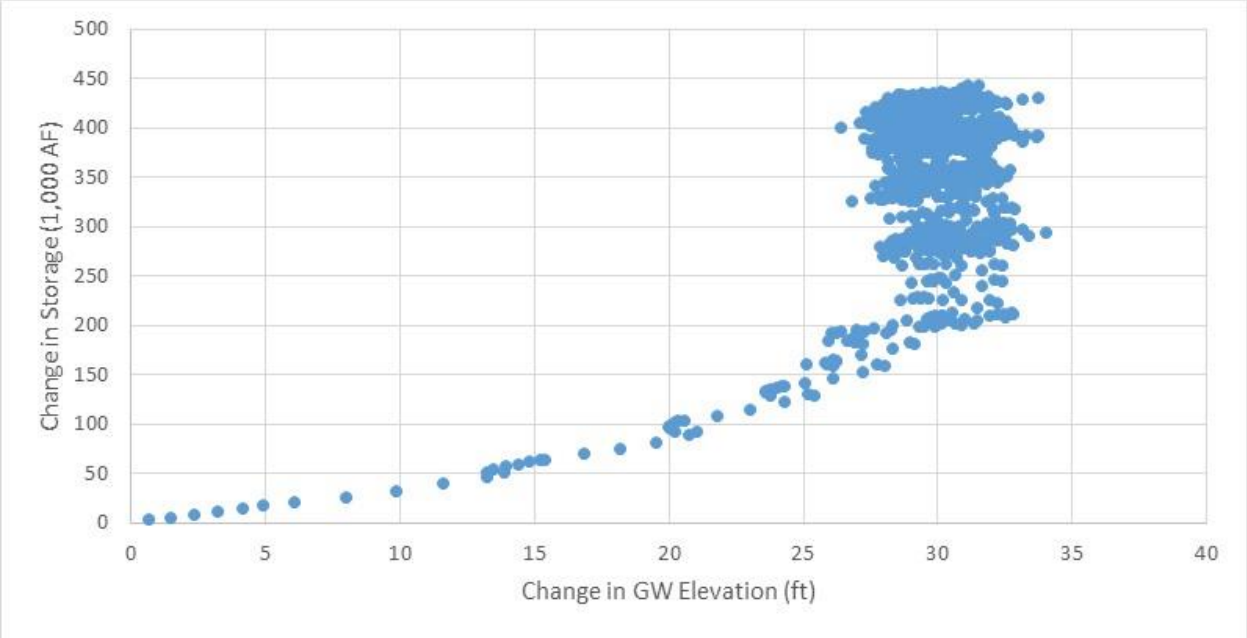


Figure 3: Simulated change in groundwater storage with groundwater elevation, 2030 climate conditions

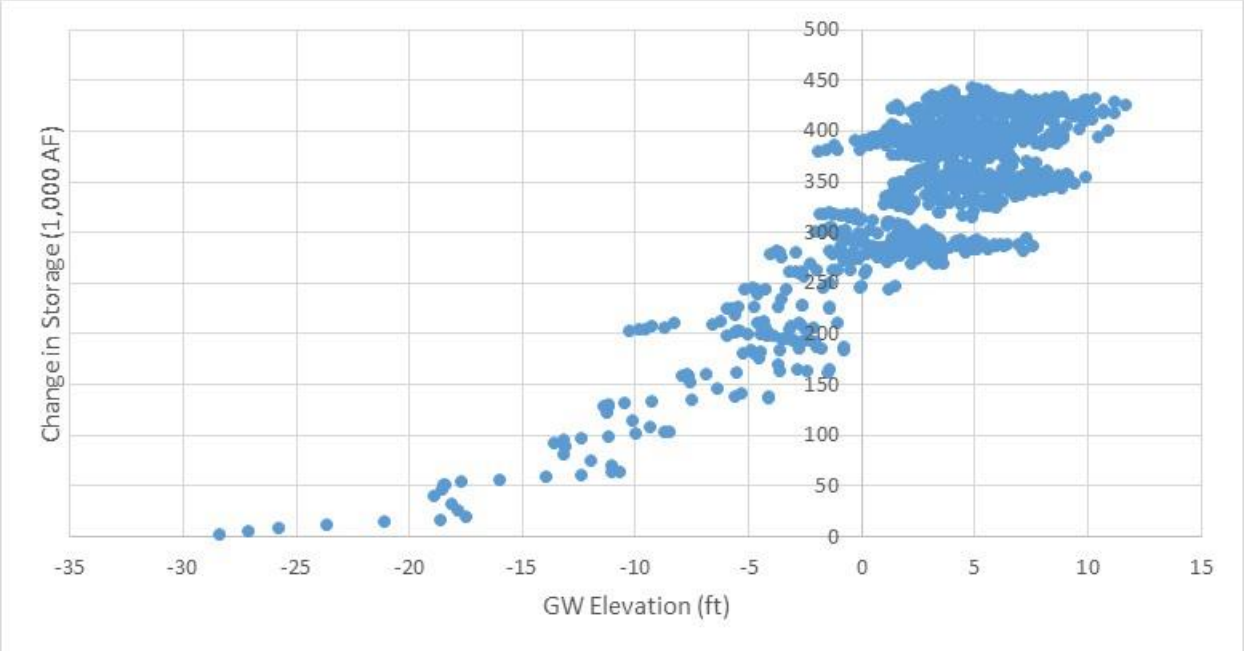


Figure 4: Simulated change in groundwater storage with change in groundwater elevation, 2070 climate conditions

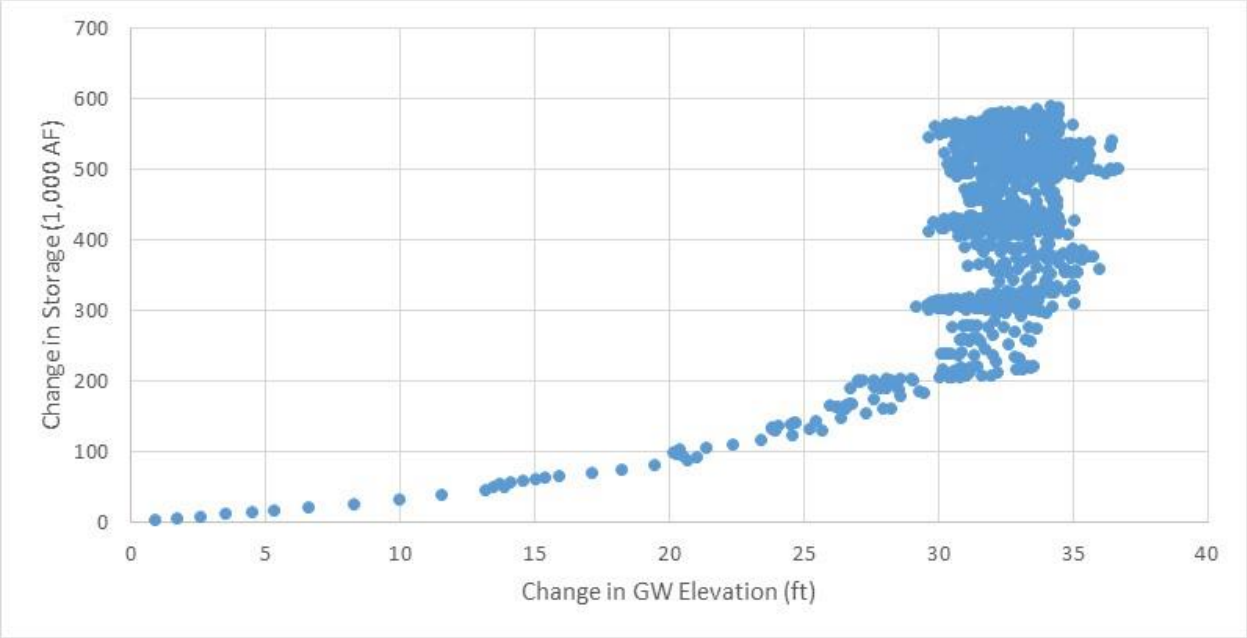
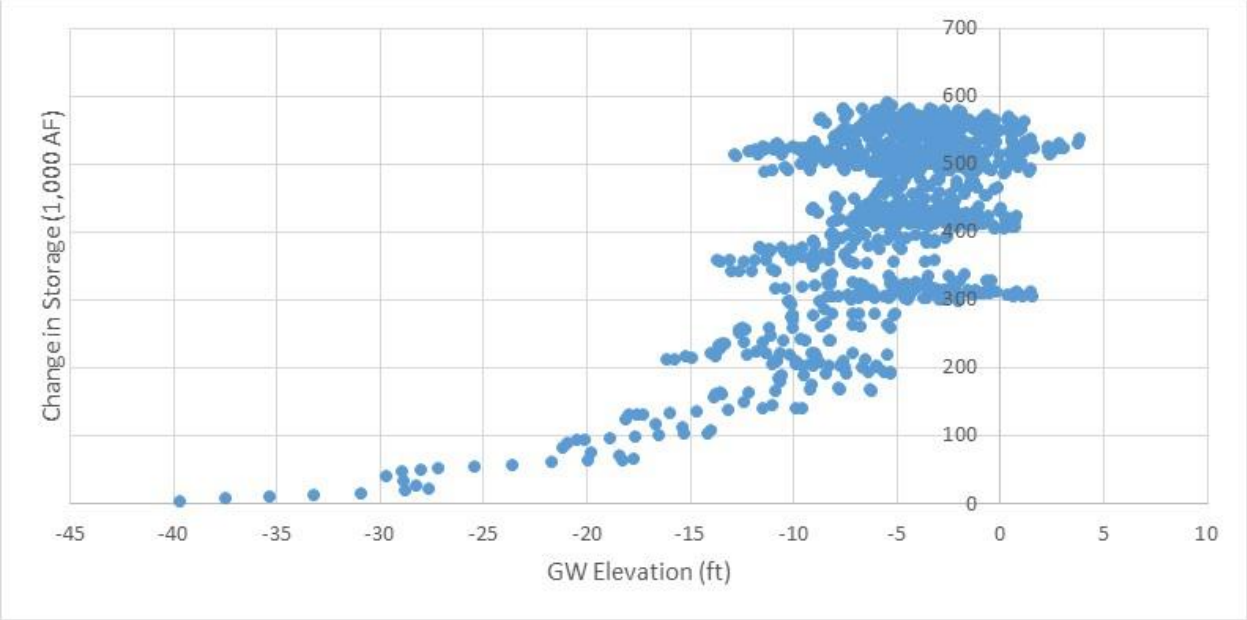


Figure 5: Simulated change in groundwater storage with groundwater elevations, 2070 climate conditions



All appurtenant facilities, including hydropower, recreation, ecosystem, and water quality management facilities, if any

A fundamental component of the Program is long-term monitoring. It is essential to monitor the progress of the Program towards achieving the anticipated future ecological conditions and to ensure a robust groundwater banking system. To confirm that the Program remains on a trajectory toward success, ecological program monitoring can follow a three-tiered approach, including: 1) rapid qualitative monitoring at individual sites, 2) remote effectiveness monitoring of the program area, and 3) quantitative confidence monitoring on a sample of sites. These complementary approaches can be used to meet different monitoring objectives, and when combined will provide the necessary assurances that the anticipated ecological benefits are on track to be produced and ensure an effective groundwater banking system is in place. The information gained through systematic monitoring is also necessary to enable the adaptive management of the Program and ensures that the Program benefits are not only realized, but also maintained for the life of the Program.

To assist in monitoring efforts, existing infrastructure would be leveraged to the extent possible, but new monitoring infrastructure (such as wells) may be needed. The details of infrastructure requirements for banked groundwater would be identified as the groundwater bank is developed with its project partners. If new monitoring infrastructure is needed, it would be expected that wells would be located on Program stakeholder lands or rights of way or easements. See also Preliminary Operations Plan and Project Conditions (Benefit Calculation tab, A.2 and A.1 attachments, respectively).

The Program infrastructure can also be used to support emergency fire response in the Program area. As part of the Program, the delivery pipeline that will be constructed to deliver recycled water to agricultural producers can also be utilized by rural fire departments. The addition of standpipes along the delivery pipeline that meet the specifications for emergency fire response would create a supplemental source of water in the area, improving the reliability of water availability for emergency response.

Expected beneficiaries and the location of benefits

Program beneficiaries are grouped into four parties:

- Public
- Regional San
- Expected groundwater banking partner(s) (including Groundwater Sustainability Agencies, urban water suppliers in the South American subbasin, and their stakeholders)
- Agricultural Users

The principal beneficiary of the proposed Program would be the public, which benefits from the variety of ecosystem and environmental benefits. In general, the public receives benefits that include recovering groundwater levels, restoring habitats, enhancing groundwater & surface water connectivity and improving water quality in Sacramento County and the Delta. Multiple habitat conservation efforts exist, are underway, or are planned in the vicinity of the Program. The Cosumnes River Preserve is adjacent to the Program area and will benefit from potential riparian habitat restoration. Stones Lake NWR is also a beneficiary of raised groundwater elevations in relationship to their wetlands and groundwater dependent ecosystems. A flood plain restoration project, adjacent to the Program area would also benefit from a shallower water table that could keep water in the flood plain for longer

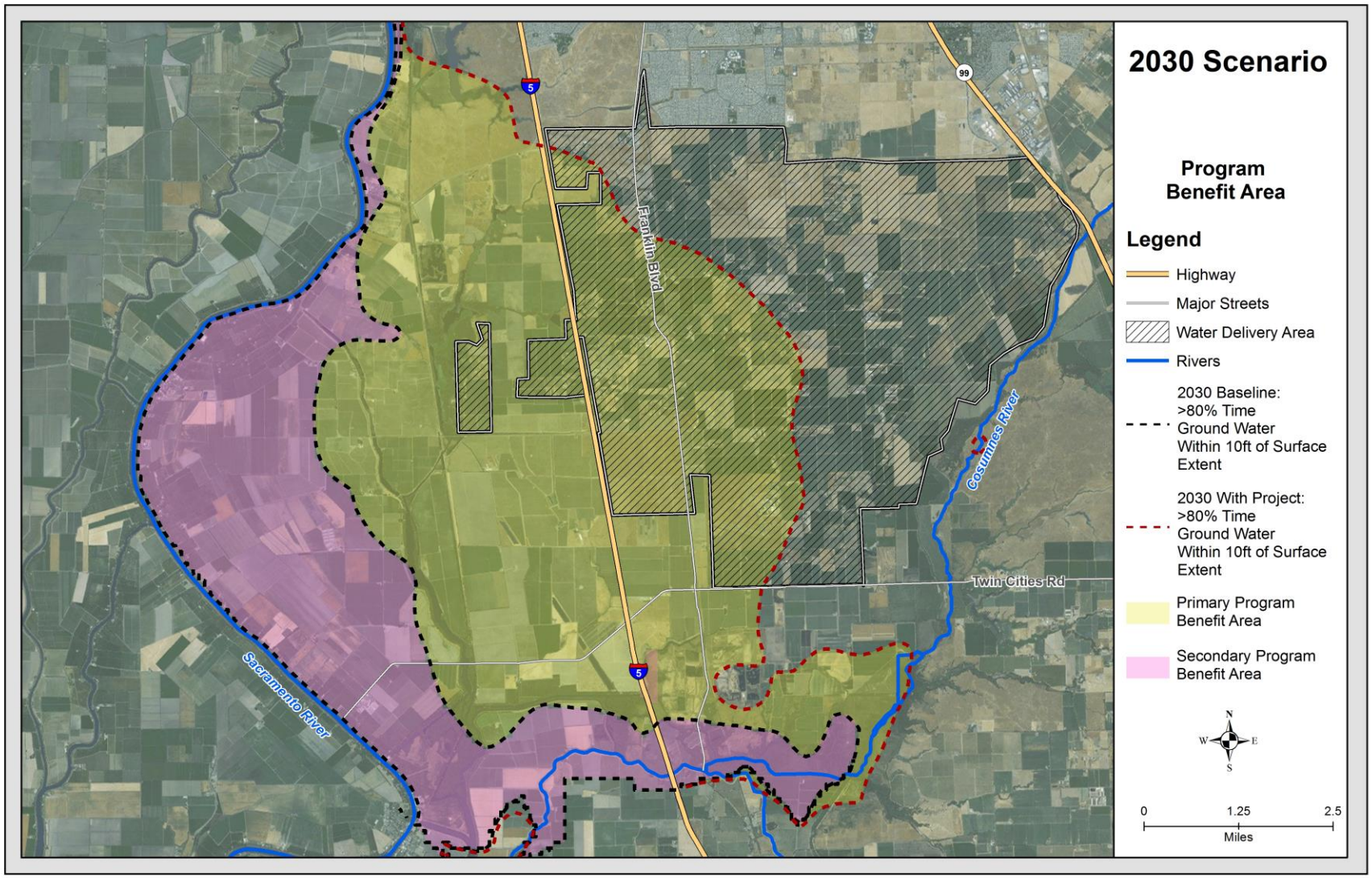
periods of time for fish habitat. Improved groundwater and surface water connectivity directly benefits the Cosumnes and Mokelumne rivers, which are tributaries to the Delta. These increased stream flows benefit Chinook salmon and other species not only in the Program area, but also in adjacent areas in and near the Delta. Benefits associated with the public are accrued in the recycled water service area shown in Figure 1 and in the adjacent Program benefit areas shown in Figure 6 and are quantified in the Benefit Calculation, Monetization, and Resiliency Tab A.3 and A.7.

Regional San and its 1.4 million customers are also beneficiaries of the Program. One of Regional San's core values is environmental stewardship. Beyond the job of protecting public health through the treatment of wastewater, Regional San engages in sustainability programs that lessen environmental impact and increase reuse. This Program allows Regional San to maximize the use of its recycled water to meet the goal of recycling 30 to 40 million gallons per day of its treated wastewater by 2025. The Program also helps Regional San and its customers promote environmental stewardship by putting its highly treated wastewater to a new beneficial use, diversifying its discharge portfolio and managing its water asset strategically. The South County Ag Program's various groundwater and ecosystem benefits help Regional San move toward accomplishing its goal of environmental sustainability and resource recovery.

The expected groundwater banking partner(s), the Groundwater Sustainability Agency (anticipated to be the Sacramento Central Groundwater Authority for this Program area) and Water Supply Interests are the beneficiaries of water supply reliability associated with increased groundwater storage and the establishment of a groundwater banking program that would provide up to 30,000 AFY of water available for conjunctive use. This conjunctive use element would allow banking partners to limit their surface water diversions during times of drought and shift to groundwater pumping of the banked water. This conjunctive use element will further the SCGA's ability to comply with SGMA. The reductions in surface water diversions could potentially be sold to other entities for municipal or environmental uses, improving water supply reliability. Program benefits would be gained in the service area(s) of the banking partner(s), primarily within the Central Sacramento County Groundwater Basin, also known as the South American Groundwater Subbasin, as well as in the Delta and the State.

Agricultural users are benefiting from Program implementation, primarily from water supply reliability associated with recycled water deliveries, improved groundwater conditions and preserving prime agricultural farm lands within the Sacramento region. These benefits are gained in the recycled water service area shown in Figure 1.

Figure 6: Program Environmental Benefit Area Map



Relationships to existing water project facilities

The SRWTP is located at 8521 Laguna Station Road in Elk Grove on an approximately 3,200-acre site that is owned and operated by Regional San. The SRWTP is permitted to discharge up to 181 mgd average dry weather flow (ADWF), or approximately 200,000 AFY, to the Sacramento River. Actual discharges vary seasonally and range from 120 to 205 mgd, with higher wet weather flows occurring in rainy periods (RMC 2016).

National Pollutant Discharge Elimination System Permit requirements from the Regional Water Quality Control Board prompted Regional San to evaluate a multitude of technologies to produce up to 181 mgd ADWF of Title 22 disinfected tertiary recycled water or 'equivalent' quality effluent. The collection of new treatment processes at the SRWTP to meet the requirements is called the EchoWater project. Construction upgrades to the SRWTP began in 2015, with treatment upgrades to be operational by May 2023 (Ascent 2014). The proposed Program would utilize up to 50,000 AFY of water produced by the EchoWater project. The recycled water would be delivered to users through a new system of distribution pipelines.

As part of an expanded Program with groundwater banking, existing groundwater wells, currently used for municipal raw water supply, would be used to support extraction for groundwater banking operations. Extraction rates, number of wells, and well locations would be determined once the banking operations are better defined and program implementation partners are identified. It is hypothetically assumed that the City of Sacramento and the Sacramento County Water Agency (SCWA), or their respective wholesale customers, would limit their surface water deliveries and shift to groundwater pumping of the banked water. Regional San is having ongoing discussions of the proposed project banking and recharge operations with the Sacramento Central Groundwater Authority, which includes a broad consortium of these agencies, including the City of Sacramento and Sacramento County. Although no final agreements have been reached with these agencies, the proposed project banking and recharge operations are consistent with the conjunctive use plans of these agencies. The proposed project extractions will be further refined in coordination with the Sacramento Central Groundwater Authority and its member agencies as a water accounting framework and groundwater bank is developed, along with additional environmental analysis. The location, timing, and amount of withdrawals would be monitored and controlled to maintain the target groundwater levels in identified habitat areas.

Water storage evaporation loss or other losses as a function of time-of-year and area

As water is stored in the subsurface, there is no evaporative loss of the stored water. Further, once stored, 100% of the water will be utilized through banking operations, improved groundwater conditions, or improved streamflow conditions. The only loss of water is through small amounts of evaporation that occur during the recharge process for winter recharge. Evaporative losses are small because this occurs in the winter, when evaporation rates are low, and only during the recharge process rather than during the entire storage period. There are no evaporative losses of the in-lieu recharged water, due to the nature of the recharge process.

Over the November to April time period, Class A pan evaporation in the Program area is 15.9 inches (WRCC, 2017). Multiplying by a coefficient of 0.80 to obtain an estimate of evaporation from shallow lakes or wet soils (WRCC, 2017) yields a value of 12.7 inches. It is unlikely that the additional application of Program recharge water will significantly increase evaporation as the total evaporation of 12.7 inches is typically met through the approximately 18 inches per year of precipitation and through supplemental

irrigation. Once recharged, there is no additional evaporation over time. Water would also exit the storage system through improved connectivity with streams and to adjacent groundwater basins. However, water movement to streams or adjacent basins are considered environmental benefits of the Program, rather than losses.

Any other features that affect benefits or impacts

The South County Ag Program has significant benefits such as, recovering groundwater levels, restoring habitats, enhancing groundwater & surface water connectivity, improving water quality and ensuring water supply flexibility for Sacramento County and the Delta. The Program would add greater flexibility to the management of the local groundwater and surface water resources conjunctively and contributes to the improved management of water resources at the regional and state-wide level.

Although the Program would divert up to 50,000 AFY of Regional San's current discharge to agricultural lands in southern Sacramento County, the impacts to Delta outflow are minimal. To put these values into perspective 50,000 AFY is less than 0.8 percent of the Dry and Critically Dry year type (D1641 40-30-30) average Delta outflow and is less than 1.3 percent of the Dry and Critically Dry year type (D1641 40-30-30) average Delta export relative to the Without Program condition. As the Program is implemented and the groundwater and surface water connectivity increases, any impacts to Delta outflows become mitigated. Essentially, as groundwater conditions improve, increases in streamflows occur and sufficient water is banked to support extractions and associated surface water diversions are reduced. After ten years of operations the impact of the Program is reduced by more than 50 percent (from 50,000 AFY down to 24,980 AFY). After twenty years of operations the impact of the Program is reduced by more than 80 percent (down to 7,970 AFY) and through the remaining life of the Program the risk of impacts to Delta outflow and Delta exporters is reduced to negligible levels. The ecosystem and groundwater storage benefits are remarkable within the first 10 years of operation.

Quantitative and Qualitative With- and Without-Project Future Conditions

Expected physical changes are analyzed and described in the Benefits Calculation, Monetization, and Resiliency Tab A.1 attachments (Regional San_CALSIM_HEC5Q_ModelingTM_A.1Project Conditions_SecBCMR.pdf,Regional San_SacIWRM ModelingTM_A.1Project Conditions_SecBCMR, Regional San_WQ Salinity TM_A.1 WQ Benefit-Quantification_SecPPB, , and Region San EcoPlan_A.1 EcoBenefits_SecPPB]).

Some of the expected physical benefits as modeled under specified climate conditions, are summarized below:

- Restores depleted groundwater levels up to 35 feet within 15 years.
- Increases groundwater storage capacity by 245,000 acre-feet within 10 years.
- Supports and increases riparian and wetland conditions on up to 4,933 acres.
- Supports an additional 700 Sandhill Cranes.
- Restores 500 acres of vernal pool habitats.
- Increases frequency of Cosumnes River instream flows that exceed 10 cfs by up to 16%.
- Increases the number of days that support fall-run Chinook salmon passage by 34%.

- Creates a groundwater banking system with approximately 30,000 AFY available for conjunctive use.
- Facilitates urban & agricultural cooperation.

References

Ascent Environmental. 2014. *Draft Environmental Impact Report for the Sacramento Regional County Sanitation District EchoWater Project.* March. https://www.regionalsan.com/post/echowater-final-environmental-impact-report-feir

California Water Commission (CWC). 2016. *Water Storage Investment Program Technical Reference.* November.

*CH2M. 2017. *Development of WSIP Climate Scenarios for use in HEC5Q*. August. GRANTS Benefit Calculation, Monetization, and Resiliency tab, A.1 Project Condition. File; "Regional San_ClimateScenariosForHEC5Q_TM_A.1_ProjectConditions_SecBCMR.pdf"

*CH2M. 2017. *South County Ag Program WSIP Application Surface Water Operations and Temperature Modeling*. August. GRANTS Benefit Calculation, Monetization, and Resiliency tab, A.1 Project Condition. File; "Regional San_CALSIM_HEC5Q_ModelingTM_A.1ProjectConditions_SecBCMR.pdf"

*Larry Walker Associates. 2017. *Far-Field Water Quality Analysis and Benefit Monetization in Support of WSIP Application for South County Ag Program*. August. GRANTS Physical Public Benefits tab, A.2 Water Quality Benefits Supporting Documents. File: "Regional San_WQ Salinity TM_A.1 WQ Benefit-Quantification_SecPPB.pdf"

**RMC Water and Environment. 2014. *Sacramento Regional County Sanitation District South County Recycled Water Feasibility Study.* May. https://www.regionalsan.com/general-information/south-county-ag-feasibility-study

**RMC Water and Environment. 2015. *South Sacramento County Agricultural & Habitat Lands Recycled Water Program Facilities Plan, Draft.* August. Updated June 2017. GRANTS Eligibility and General Project Information tab, A.4 Project Description Support. File: "Regional San_Facilities Plan_Vol1_Report_A.4_Project Description Support_SecEGPI.pdf"

RMC Water and Environment. 2016. *Sacramento Regional County Sanitation District's South Sacramento County Agriculture and Habitat Lands Recycled Water Program Draft Environmental Impact Report (SCH#: 2015022067).* July. https://www.regionalsan.com/post/south-county-ag-final-environmental-impact-report

*RMC Water and Environment. 2017. *Integrated Groundwater and Surface Water Modeling Results Technical Memorandum*. August. GRANTS Benefit Calculation, Monetization, and Resiliency tab, A.1 Project Condition. File; "Regional San_SacIWRM ModelingTM_A.1Project Conditions_SecBCMR.pdf"

*The Freshwater Trust. 2017. *Conceptual Ecological Plan & Ecosystem Benefits*. August. GRANTS Physical Public Benefits tab, A.1 Ecosystem Benefits. File: "Region San EcoPlan_A.1 EcoBenefits_SecPPB .pdf"

Western Regional Climate Center (WRCC). 2017. *Monthly Average Pan Evaporation*. Lodi, California Station. Data available online: https://wrcc.dri.edu/htmlfiles/westevap.final.html. Accessed July 21, 2017.

*Available as attachment to this grant application under the Benefits Calculation, Monetization, and Resiliency Tab
**Available as attachment to this grant application under the Feasibility and Implementation Risk Tab